

NON-PUBLIC?: N
ACCESSION #: 8806020271
LICENSEE EVENT REPORT (LER)

FACILITY NAME: Perry Nuclear Power Plant, Unit 1 PAGE: 1 of 3

DOCKET NUMBER: 05000440

TITLE: Unexpected Bypass Valve Opening During Reactor Startup Due to
Procedural Deficiency Results In a Level 3 Reactor Scram
EVENT DATE: 04/30/88 LER #: 88-015-00 REPORT DATE: 05/27/88

OPERATING MODE: 2 POWER LEVEL: 001

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR
SECTION
50.73(a)(2)(iv)

LICENSEE CONTACT FOR THIS LER:

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SUPPLEMENTAL REPORT EXPECTED: No

ABSTRACT: On April 30, 1988 at 1754, during plant startup a reactor scram occurred due to a reactor water level of less than Level 3 (+177.7 inches above top of active fuel). This event occurred during a plant startup when the steam bypass valves opened unexpectedly upon opening of the B Main Steam Isolation Valve (MSIV) resulting in the level transient.

The root cause of this event was a procedural deficiency. The operating procedures did not adequately address the interaction or provide adequate setpoint margin for the Steam Bypass and Pressure Regulating System when opening MSIVs. An additional concern associated with this event was that the Steam Bypass Valve Open alarm and annunciator were not noticed by the control room operators.

Corrective Actions to prevent recurrence include; a revision to the operating procedures to ensure that the bypass system does not unnecessarily operate when opening the MSIVs at pressure, counseling of the operators involved regarding their responsibilities toward alarm response and knowledge of plant conditions, and training for all operators regarding the sequence of events. Additionally, a human factors review has resulted in a design change which will upgrade the priority color coding of the bypass valve open annunciator from white to amber.

(End of Abstract)

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On April 30, 1988 at 1754, a reactor scram occurred due to a reactor pressure vessel (RPV) water level of less than Level 3 (+177.7 inches above top of active fuel (TAF)). At the time of this event, the plant was in Operational Condition 2 (Startup) conducting a plant startup. Reactor thermal power was less than 1 percent of rated and reactor pressure was approximately 194 psig.

On April 30, at 1725, operators brought the reactor to criticality and prepared to open the inboard Main Steam Isolation Valves (MSIV) (ISV). At 1752, with reactor pressure approximately 194 psig the B inboard MSIV was opened resulting in an expected reactor water level swell due to the pressure drop. Also at this time, unexpected and unnoticed by the operators, the Main Turbine Bypass Valves operated to approximately 50 percent open due to sensed main steam line pressure surging above the adjustable pressure setpoint for the Steam Bypass and Pressure Regulating System (SBPR) (JI). Indicated reactor level peaked at approximately 238 inches above TAF and then began decreasing. At 1753, plant operators evaluated the level swell condition and opened the remaining three MSIVs. At 1754, operators began increasing feedwater flow due to reactor level reaching 183 inches above TAF and still decreasing. Shortly thereafter, reactor level reached the Level 3 trip point resulting in the Reactor Protection System (JC) actuation and full reactor scram. At 1756, reactor level was restored above Level 3, the turbine bypass valves had reclosed due to the sensed steam line pressure decreasing below the SBPR pressure setpoint. At 1757, operators reset the reactor scram signal. All involved plant systems functioned as designed during this event. The post scram analysis was completed and the plant entered Operational Condition 2 at 0627 on May 1, 1988.

The root cause of this event was a procedural deficiency. This was the first reactor startup in which the MSIVs remained closed and were subsequently opened at RPV pressure greater than 15 psig. The applicable operating procedures did not adequately address the interaction with the SBPR system when opening MSIVs. Integrated Operating Instruction (IOI)-2, "Hot Startup", which was being utilized during this plant startup, requires that the main steam line pressure setpoint be established 25-50 psig above the indicated pressure in order to prevent unnecessary bypass valve operation. However, System Operating Instruction (SOI)-B21, "Nuclear Steam Supply Shutoff, Automatic Depressurization, and Nuclear Steam Supply Systems", which is utilized to open MSIVs, allows for a differential pressure across the MSIVs of up to 50 psig between RPV pressure and main steam line pressure. Therefore, the margin between the sensed main steam line pressure and the pressure setpoint is effectively eliminated when the MSIVs are

opened, resulting in bypass valve operation. An additional concern associated with this event was that the Steam Bypass Valve Open alarm (ALM) and annunciator (ANN) were not noticed by the control room operators. This problem has been attributed to inattention to detail with a contributing factor of a lack of priority color coding of the annunciator window.

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Reactor power level was low (less than 1 percent) during this event and the resulting thermal transient was small. The lowest reactor water level during this event was approximately 175 inches above TAF as indicated by the narrow range level instrumentation. Plant systems responded as expected to maintain the plant in a safe condition. The SBPR system provides for system pressure control by controlling main steam pressure immediately upstream of the main turbine stop and control valves through modulation of the turbine-control and steam-bypass valves. At high power operation, the MSIVs would be open and thus could not cause a pressure surge in the main steam lines. If the bypass valves were to open for some reason during high power operation, the worst case consequence would be a high steam line flow or low steam line pressure with a resultant MSIV closure trip, which is an event analyzed in the Perry Safety Analysis Report. Therefore, this event had no safety significance at any power level. No previous similar events have been identified.

To prevent recurrence of this and similar events in the future, the following corrective actions have been or will be implemented.

1. SOI-B21 was revised to provide the necessary guidance to ensure that bypass valves do not open unnecessarily when opening MSIVs during plant startup. Anytime the MSIVs are opened, the pressure setpoint must be adjusted to 200-400 psig above the indicated main steam pressure. Additionally, this step is now performed immediately before MSIV opening.
2. Operators have been counseled regarding their responsibilities toward alarm response and knowledge of plant conditions.
3. In accordance with the licensed operator requalification training program, operators will receive training on the sequence of events which led to this report.
4. A human factors review has resulted in a design change which will upgrade the priority color code of the "Steam Bypass Valve Open" annunciator from white to amber.

Energy Industry Identification System Codes are identified in the text

as (XX).

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